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ENVIRONMENTAL QUALITY

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WORLDWIDE REPORT ENVIRONMENTAL QUALITY

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NEW PLANNING, ENVIRONMENTAL BILL FOR SOUTH STUDIED

Canberra THE AUSTRALIAN in English 3 Jun 81 p 19

[Text] Major reforms to planning legislation are to be introduced this month in the South Australian Parliament.

The new legislation will streamline decision-making and provide more flexible methods of regulating development in urban and rural areas.

Under the proposed Planning and Environment Bill, all forms of development, including mining, will come under the same act.

It will be introduced and then lie on the table to allow public consultation before being debated, probably during the Budget session in September or October.

It will replace the Planning and Development Act which had covered planning matters since 1967.

The Minister of Planning, Mr Wotton, said the new legislation was designed to simplify the present procedures under the Planning and Development Act rather than introduce new policies.

"Policy matters are established by councils, in consultation with the State Planning Authority, and councils will still have that power," he said.

Mr Wotton said the legislation would:

- Replace the 11-member State Planning Authority with a three-man commission.
- Establish an advisory committee of people experienced in local government, environmental matters, commerce and industry, rural affairs, housing and transport.
- Establish uniform but simple administrative procedures to be used by all councils when dealing with development applications.
- Enable the impact of significant projects to be fully assessed with the final decision being taken at the State level.

--Establish a system for formulating planning and environmental policies which is responsive to changing circumstances.

--Ensure a more appropriate sharing of powers and responsibilities between councils and the State Government, and provide for decision making on local matters at the local level.

--Integrate development and land division decisions.

--Introduce compulsory conferences before appeal hearings begin.

Mr Wotten [as published] said the Planning and Development Act had been amended by 23 Acts since 1967 and covered 153 separate sets of regulations and 45 sets of amending regulations, administered by 29 councils with full zoning regulations [as published], and about 90 councils which use interim planning controls.

There were now confusing differences in the powers and procedures operating throughout the State.

The differences had arisen through councils gradually recognising the need to exercise some control over development, and this had led to different approaches at different times.

"Many councils are operating interim controls which start to expire in 1982, and this presents an opportunity for a comprehensive State-wide reappraisal," he said.

CSO: 5000

VICTORIA'S NEW CLEAN AIR POLICY TO CUT MELBOURNE SMOG

Melbourne THE AGE in English 8 Jun 81 p 15

[Article by Andrew Bolt]

[Text]

Victoria's new air protection policy, proclaimed last week, calls for immediate action to reduce Melbourne's regular photo-chemical smog.

The policy says the acceptable levels for hydrocarbons and oxides of nitrogen often are exceeded in the Port Phillip region. Visibility is often below acceptable standards. (Hydrocarbons and oxides of nitrogen react under strong sunlight to form photochemical smog).

The policy says a control programme to reduce emissions of hydrocarbons should be put into action as soon as possible. The Environment Protection Authority claims that programmes now being developed could cut hydrocarbon emissions by about 25 per cent over 15 years.

Part of this reduction will be due to vehicle emission controls agreed upon by the State Governments last year. The EPA also is working with petrol companies to try to cut down on the

amount of petrol (a form of hydrocarbon) being lost through evaporation from storage tanks and filling processes each it estimates that it can save about 3000 litres of petrol being lost this way each year in the Port Phillip region.

The EPA also is worried about emissions of hydrocarbons from paints and solvents. This problem gradually is being reduced with the development of water-based paints, paints with a high solid content and powder-coating techniques.

The policy also calls for action on backyard incinerators. Backyard burning is responsible for as much as 8 per cent of hydrocarbon emission and the policy says it eventually may have to be prohibited. Meanwhile, the EPA is considering limiting the use of backyard incinerators at times when pollution is high or dispersal poor. On such days the authority would issue notices banning waste burning. These would be policed by all the metropolitan councils, which would prosecute under their by-laws.

BRIEFS

CATCHMENT COAL-MINING BAN--The State Minister for Mineral Resources, Mr Mulock, made a precedent-setting decision this week against coal-mining under a nature area. Mr Mulock announced yesterday that after hearing strong representations from Mr W. Knott, the Labor MP for Wollondilly, he had cancelled mining leases under the catchment area of Minnimurra Falls, west of Kiama. The lease was part of the Austen and Butta Pty Ltd's Yellowrock colliery, north of the falls. Minnimurra Falls is a spectacular waterfall and nature reserve in the ranges near Jamberoo near Kiama. Mr Mulock said he was convinced from technical advice that exploratory mining would not have had any adverse effect on the catchment area of the falls. There was already extensive underground mining under water storage catchment areas in these districts which had not caused any problems. However, he said he realised that there was genuine concern in the local community that the falls could suffer as a major tourist attraction. In compensation for loss of the falls catchment area, Austen and Butta would be given rights to mine in an area west of the catchment. This would ensure that there was no threat to the employment of 50 local coal mine workers. Mr Mulock's decision is seen as a major concession to conservationists who have opposed the plan to mine under national parks in the Sydney region. The proposal to mine under national parks, which has been the subject of a policy document prepared for consideration by State Cabinet, has caused a form of protests from conservation groups. [Text] [Sydney THE SYDNEY MORNING HERALD in English 16 May 81 p 15]

BARRIER REEF PROTECTION--Canberra--The Federal Government is again coming under pressure to protect the Great Barrier Reef from oil and mineral exploration and drilling. Yesterday, both the Young Liberal Movement and the Federal Opposition called for more adequate protection for the reef. The Young Liberals urged the Government to make the entire Barrier Reef region a marine park, and at the same time attacked the pro-mining stance of the Queensland Government. The movement said there was a "real possibility" of industrial development being allowed on the reef if the Federal Government did not act soon. The ALP spokesman on environment and conservation, Mr West, said the new petroleum legislation introduced in Parliament on Thursday gave the reef no protection from oil drilling. The legislation, the Petroleum (Submerged Lands--Miscellaneous Amendments) Bill, will permit oil exploration in the Coral Sea. It has no clause prohibiting the granting of drilling permits at any specified distance from the reef. [Text] [Melbourne THE AGE in English 16 May 81 p 6]

RIVER OIL SPILL FINE--Melbourne--Mobil Oil faces prosecution and a \$5000 fine under the Environment Protection Act for the accidental spillage of 15,000 litres of oil in the Yarra River on Monday. A Mobil spokesman said yesterday the oil slick had almost been mopped up and the remaining oil was contained to an area near its Yarraville terminal. The oil was spilt after a malfunction in a separation process at the terminal. [Text] [Perth THE WEST AUSTRALIAN in English 20 May 81 p 49]

UNION CONSTRUCTION BAN--Gladstone, a town of more than 20,000 people on the central Queensland coast, must stop growing--by order of the trade union movement. The bustling town with its alumina refinery, the State's largest powerhouse and aluminium smelter and huge cement works under construction, will come to a standstill on July 1 to endorse the union recommendation. An estimated 10,000 blue and white collar workers will hold a mass meeting on the proposition that all future industrial construction be banned. The secretary of the Queensland Trades and Labor Council, Mr Fred Whitby, said yesterday: "The problem is that Gladstone is like topsy...it has just grown. People have flooded into the town chasing work and there simply isn't the infrastructure to support the influx. It is a classic case of an ill-planned private-enterprise sponsored society that is in grave danger of becoming a gigantic slum." Local union sources said last night it was certain the Gladstone unionists would support the construction ban. "The Gladstone debacle should be enough to make the governments aware of their responsibilities and deny ad hoc development where the facilities simply are not there," Mr Whitby said. [By Max Jessop] [Excerpts] [Canberra THE AUSTRALIAN in English 28 May 81 p 3]

TOXIC WASTE DANGER--More than 50 200-litre (44-gallon) drums containing highly toxic chemicals which could cause serious lung, eye and skin complaints are adrift in the Hawkesbury River system or lodged in vegetation along its shores. The NSW Health Commission is concerned that the drums, containing a residue of the chemical Toluene Diisocyanate--or TDI--might be put to dangerous use by people unaware of its toxic properties. An official of the commission said: "We are worried that they may be picked up and modified as rainwater tanks or incinerators." When heated, TDI gives off toxic gas and when mixed with water it becomes solid and will be retained in the drum. If touched, it can cause skin eruptions. The drums were part of a floating bridge used to carry the Sydney-Newcastle natural gas pipeline across the Hawkesbury near Spencer. They floated away after the pipeline was in place last December. [By James Cunningham] [Excerpts] [Sydney THE SYDNEY MORNING HERALD in English 6 Jun 81 p 3]

WA AS SALINITY LAB--WA's south-west agricultural areas could become a salinity research laboratory for all the Mediterranean regions of southern Australia if a report by the CSIRO State committee is accepted. The report, which was completed in January, is being evaluated by the CSIRO directorate in Melbourne. It recommends that the CSIRO should: [1] Initiate a long-term programme of research to provide agronomic options for more efficient use of soil water, in order to minimise the adverse effects of salinity on soil and water resources. [2] Expand its research on native forest ecosystems, especially those relating to ecosystem function and inventory, measurement and planning. [3] Consider initiating a research programme concentrating on the problems of maintenance and management of land-use systems that combine part-clearing with agricultural production. The report was compiled by a subcommittee made up of representatives of CSIRO, State government departments and private industry. [By Alex Harris] [Excerpt] [Perth THE WEST AUSTRALIAN in English 6 Jun 81 p 36]

DEFICIENCY OF ZINC IN SOIL REPORTEDLY WIDESPREAD

Bombay THE TIMES OF INDIA in English 4 Jun 81 p 20

[Text] Widespread deficiency of zinc in soils has become one of the formidable hurdles in raising agricultural productivity in the country. In some pockets, especially in low-lying areas, the deficiency of this important plant micro-nutrient is reported to be so severe that the crop yields have declined sharply.

The occurrence of zinc deficiency, revealed earlier by soil and plant analysis, has now been confirmed from the responses of crops to applied zinc in several greenhouse and field experiments. Of about 2,800 trials conducted throughout the country recently, crop yields went up tangibly in about five per cent cases on application of zinc to the soil. The increase in productivity varied from two to five quintals a hectare.

The incidence of zinc deficiency has been found to be maximum in wheat-growing areas. The major rabi belt of the country, where multiple-cropping with wheat is in vogue, appears to be suffering most from paucity of zinc in the soil.

Zinc deficiency is believed to be an obstacle to higher yields, not only in wheat but also in crops like pearl millet, sorghum, finger millet, groundnut, maize and cotton.

Application of about 50 kg of zinc sulphate per hectare before sowing is commended by experts as a measure for alleviating the zinc deficiency. The effect of one application is believed to last for about four to five seasons.

Spraying of a solution of zinc sulphate and lime on the crop foliage is recommended as a treatment for the zinc deficiency when it is noticed on standing crops. The number and frequency of sprays depends on the severity and persistence of deficiency.

Measures like seed-soaking, dusting of seeds with zinc salts or multimicro-nutrient carriers can contribute to a saving of zinc. But such treatments provide only a temporary relief, experts maintain. In the case of rice, however, dipping of the roots of seed in zinc oxide suspension helps to save zinc while preventing any decline in the yield.

About one kg of zinc oxide applied to roots produces the same effect as the application of 50 kg of zinc sulphate to the soil, it is pointed out.

CSO: 5000/7053

BRIEFS

LAND DEVELOPMENT LOANS--The Commission for the Environment is worried about the environmental effects of Land Development Encouragement Loans, and is mounting a comprehensive study. The loans were introduced in the 1978 Budget to develop unimproved or reverted land for farming. Under the scheme, concessional loans are made to help eligible farmers with the initial development. From August 1, 1978 to March 31, 1979, 2500 applications were received by the Rural Banking and Finance Corporation and 1661 loans authorised worth \$29.59 million. This investment will develop more than 200,000 ha of farmland, with an export earning potential of \$30 million a year, according to the Corporation. From April 1, 1979 to March 31, 1980, 1744 loans were approved for a total area of 203,300 ha. The Commission is worried that the removal of soil cover made possible by these loans could cause, in the short term, increased surface erosion and in the long term, mass instability when the tree roots rot away. Areas susceptible to erosion needed to be identified and the removal of bush cover prevented, said a Commission officer, Mr K. Murray. Other matters of concern included the removal of forest remnants of high botanical and scientific interest. Close consultation would be needed between the farmers, Rural Bank appraisers, and the local catchment authority, he said. [Text] [Christchurch THE PRESS in English 18 May 81 p 7]

WILDLIFE REFUGE ENDANGERED--An area of land near the Pauatahanui inlet has been proposed for use as a Lockwood show home site and several people are not happy with the idea. Mr Phillip Tuohy, who is responsible for the erection of Lockwood homes in the Wellington region, plans to buy the area of land directly opposite the Taylor Stace cottage in Pauatahanui. He intends to use it for a show home site, complete with offices, materials store and replaceable show homes. The National Forest and Bird Society plans to lodge an objection to Mr Tuohy's proposal, however, as the area intended for the show homes backs onto a gazetted wildlife refuge that they feel could be harmed by the development. The president of the society, Mr A.A.T. Ellis says the society has plans for developing the whole of the Inlet area into a wildlife reserve and the Lockwood proposal would interfere with and upset those plans. The society's national conservation officer, Mr Dave Collingwood, says the wildlife area is a very important marsh area for wading and sea birds and is a route stop for migratory birds. He, too, fears the proposal may disturb the bird sanctuary. [Excerpts] [Wellington THE EVENING POST in English 20 May 81 p 44]

LAKE DAMAGE CONTROLS--The Bay of Plenty Catchment Commission has been asked to speed up controls over earthworks and other land use which could have a damaging effect on Rotorua lakes. The request, from the Rotorua District Council, has been sparked by concern at the effects of land development and the stripping of vegetation on private land at Okere Falls, Lake Rotoiti. About six months ago the council asked the commission to use its powers under section 34 of the Soil Conservation and Rivers Control Amendment Act, 1959, to control detrimental land use in the area. Section 34 gives the commission power to designate certain areas of land where no work which could lead to soil erosion, blockage of watercourses or other adverse environmental effects can take place without permission. The council now wants to widen the scope of the controls and has asked the commission to use its powers under the act to ensure that all lakes in the district are adequately protected from the adverse effects of land development. (Excerpt) [Auckland THE NEW ZEALAND HERALD in English 26 May 81 p 2]

WILDLIFE INFORMATION CENTER--The Minister of Science and Technology, Dr Shearer, yesterday announced the establishment of a biological resources centre to gather and distribute information on the country's wildlife populations. Dr Shearer said that the centre, to be housed at the head office of the Department of Scientific and Industrial Research in Wellington, was intended to store all biological information relevant to future development in New Zealand. One of the aims of the centre is to provide prospective land developers with information on the likely effects of the development on wildlife. [Text] [Auckland THE NEW ZEALAND HERALD in English 27 May 81 p 1]

CID: 5000/9033

ENVIRONMENTAL PROTECTION STEPPED UP DURING READJUSTMENT

Guangzhou HUANJING (ENVIRONMENT) in Chinese No 4, 1981 pp 2-3

[Article by Chen Xiping (7115 6007 1627), Deputy Director of the State Council's Environmental Protection Task Force Office: "Environmental Protection Work Should Be Stepped Up During the Period of Readjustment"]

[Text] The State Council recently made the decision to step up environmental protection work during the period of national economic readjustment. How to step up environmental protection work and whether progress can be made hinge on a unified understanding of the problem and taking the right approach.

At present there is an erroneous tendency to artificially separate environmental protection from production development, and even make them oppose each other. Environmental workers only care about environmental problems and do not involve themselves with economic development. Many comrades still remain in the stage of treating the "three pollutants" and believe that nothing can be done without money. On the other hand, economic workers are only involved with value of production and volume of production and do not care about the pollution and damage to the environment brought upon by production. Some even believe that since the nation is poor today, the only way is to get the production going and then solve the environmental problem when there is more money. If these mistaken tendencies are not corrected, the environment will continue to deteriorate and the economy cannot really move ahead.

Economic development and environmental protection are really parts of an organic integral and they are two sides of the same thing. The relationship between them is a mutual constraint and they are mutually promoting. Anyone who goes against this intrinsic rule will have to pay a price. Industrially advanced nations have learned their lesson. We have made the same mistake due to insufficient understanding of the problem over the years and due to the influence of the "leftist" thinking and that is what led to today's mess. During the period of national economic readjustment, it is time to correct this mistaken tendency.

If corrections are to be made, there must be a uniform understanding and the proper approach must be taken. When various economic departments set their goals for economic development, it should be made clear what the layout will be, how much the standard of living will be improved, what kind of standard the environmental quality should meet. Especially, in the potential development and innovation in

old enterprises, it should be made clear to what extent the environmental quality needs to be improved so that a unified planning and a balanced approach can be taken toward environment and economic development.

The viewpoint that we should get the economic development going first and protect the environment later when there is money may appear to make sense on the surface and may speed things up. But, if that approach is taken, before long the environment problem will turn around and hurt production, the development speed will be impeded and the result is haste makes waste.

The various environmental protection departments should also correct their viewpoint of environment for environment's sake and recognize that environmental problems are brought by economic development and can only be solved through economic development. Therefore, during the period of readjustment, relevant policies and guidelines should be brought together so that some aspects of pollution and damage to the environment can be brought under control and then strive for more improvements.

All it takes is a drastic change in our perception and thoroughly carrying out the relevant policies and guidelines set by the State Council. Environmental protection work can indeed be stepped up during the period of readjustment. It is proposed by the State Council that medium and small enterprises that are wasteful, economically inefficient, seriously polluting and fighting for resources with the large enterprises should be shut down, combined or transformed. Capital construction should be greatly suppressed, some import activities should be discontinued and capital construction in the future should undergo feasibility studies. Great efforts should be devoted to technical reforms centered around conservation and the policy for future industrial development should rely principally on developing the potential of existing enterprises and making modifications to improve the economic effectiveness. These are powerful guarantees for controlling pollution and improving the environment in the period of readjustment. If the environmental protection departments can join forces with the economic departments in stepping up investigation and research, grasp the actual situation of the environment, propose scientifically-based and practical readjustment measures, the road toward environmental protection will be wider, the pace for improving the environment will be faster and the decisions of the State Council will be put on a solid basis.

Naturally, there will be many difficulties that require us to unify our step and action, to learn various economic policies and industrial techniques, and to organize experts and management personnel in various fields to play their proper role. As to the question of investment, we should not only strive to open up all the avenues but also do it according to our strength. If we can do all these, the environmental protection work can surely be stepped up and move forward during the period of national economic readjustment.

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CSO: 5000/4075

'ACID RAIN' INVESTIGATION DURING SUMMER OF 1980 REPORTED

In Beijing

Beijing HUANJING KEXUE [ENVIRONMENTAL SCIENCE] in Chinese, Vol 2, No 2, 30 Apr 81 pp 50-54

[Article by ZHAO Dianwu, [6392 3013 0063], MOU Shifen [3664 0013 5358], CHEN Letian [7115 2867 1815], and LIU Kena [0491 0344 4780]]

[Text] "Acid rain" has attracted considerable attention in recent years.

In the winter of 1979-80 and the summer of 80, the authors gathered snow and rain specimens from several points of Beijing to proceed with analysis. The objective is to carry out a preliminary investigation of the "acid rain" problem under the concrete conditions of North China, in order to establish a foundation for further studies.

I. Specimen Gathering and Analysis

Specimens are gathered from 10 locations (see Table I.)

Due to limitations of the current condition, such air pollutants as SO_2 , NO_x , dust, and meteorological factors cannot be tested at the same time.

Based upon an estimate of the surrounding conditions, of the various points of specimen gathering, the 4 points of Pingmen, Dengshikou, Dongdan, and Xisi are suffering from relatively severe air pollution. Air pollution is less severe for Fouchengmen and the Central Nationality College; it is rather mild at the Institute of Environmental Chemistry and Huairou County.

The items of analyses and the results are explained in Table I. The pH is determined with a PHS-2 acidity meter; the Ca^{++} with the EDTA complex titration method; other ions with the Dionex-14 ion chromatograph.

II. Preliminary Analyses of Results

(1) Acidity (pH)

For testing pH values, there are a total of 39 rain specimens (the average value is taken for specimens collected from separate sections). Fig. 1 shows the frequency of appearance of the various values: pH 6-7 appear 29 times, amounting to 74 percent; pH 5.5-7 appear 37 times, amounting to 94 percent. These results are similar to those of Aug 73 and May 74. The SO_2 level of the winter heating season is

3 times that of the summer, but the pH of the snow and that of the summer rain remain close.

With respect to spatial distribution, the pH of the various rains is not observed to have any obvious regularity, although the conditions vary regarding fuel usage, industry, and transportation in areas surrounding the various points from which the specimens are taken. Foreign scientists have pointed out that due to the fact that suburbs have fewer granular substances, the acidity of rainwater is higher than that of the urban area. This situation cannot yet be apparently observed in Beijing at present. No relationship between pH and the various ions is observed. The same result is also reported by someone in Japan.

In the process of precipitation, the pH value generally drops gradually (see Table II). This is due to the fact that the neutral acid substances (granular materials) in the air are washed by the rainwater and become fewer in number. Judging from the data of 26-28 Aug, however, after a reduction of pH there appears to be a tendency for it to rise again. The same situation is observed for SO_4^{2-} and NO_3^- , while their rise occurs before that of the pH.

Judging from the data of acidity of rainwater obtained from this test and past tests, the rainwater in Beijing is close to neutral at present. It cannot yet be said that acid rain formed by artificial pollution has occurred.

(2) Various Ions

The average density of various ions in the rainwater is given in Table I. It may be observed that the highest in the specimens is always SO_4^{2-} , followed by Ca^{++} , NO_3^- , Cl^- , Na^+ . There is very little F^- in all the specimens. This condition is similar to that of granules in the air of Beijing. The ratio of SO_4^{2-} and NO_3^- in the granules is about 2-3 in weight. In the rainwater, it is generally greater than 3.

Judging from the geographical areas of the specimens, the average density of all types of ions of the specimens of Hepingmen and Fouchengmen is almost always higher, while that of those of the Institute of Environmental Chemistry and the Central Nationality College in the nearby suburbs where there are fewer factories is lower. This condition reflects the condition of pollution of the locality and at the same time demonstrates an obvious effect of the pollution of the air just above the ground surface on the quality of the rainwater. But, as it has been stated before, there is no regularity in the spatial distribution of pH values. Perhaps, under the condition of high granule level, the pH of the rainwater is the result of a complex effect of many factors.

The level of SO_2 in the summer air of Beijing and its nearby suburbs is not high. According to a test in Beijing, in Sep 79 the daily average density of SO_2 in the nearby suburbs is 0.04 mg/m^3 , and that of NO is 0.10 mg/m^3 . In the remote industrial suburbs, although the level of summer SO_2 is very high (the daily mean in Sep 78 is 0.14 mg/m^3) but its contribution to the SO_4^{2-} level of the nearby suburbs is not great. The source of the SO_4^{2-} of the rainwater of the city is, therefore, a problem to be clarified.

There exists a relationship between the equivalent density of SO_4^{2-} and that of NO_3^- in the rainwater, in a coefficient of $r = 0.8$ (see Fig 2). This is the only case of close relationship among the various ions tested.

The equivalent density of NH_4^+ and SO_4^{2-} in the granules of the air of Beijing has a relatively stable ratio, being 0.63-0.78, but the ratio of the two in rainwater varies a great deal, being 0.23-1.3'.

(3) Negative, Position Ion Balance

In the rainwater, the total equivalent density of negative ions and positive ions should be equal. In foreign acid rain researches, generally SO_4^{2-} , NO_3^- , Cl^- , and $\text{H}^+(\text{pH})$, NH_4^+ , Ca^{++} , Na^+ , K^+ , Mg^{++} are tested, and a balance is generally reached.

The test results with relatively complete data are listed in Table III for computing negative, positive ion balance. It may be observed from the table that aside from a few individual cases, the total equivalent density of positive ions is much greater in most cases. This fact indicates that under the current condition of Beijing, in studying the acidity of rainwater, consideration perhaps should be given to other negative ions.

This problem will have to be clarified in future researches. The situation is possibly the action of HCO_3^- , which has 3 possible sources: fuel products (CaO etc.) soil granules, and CO_2 in the air. The rainwater specimens are heated to expel CO_2 . After heating the pH is obviously higher. This fact indicates the existence of HCO_3^- influence.

III. Conclusion

(1) Judging from the test results of winter and summer of 1979-80, the rainwater of Beijing at present is close to neutral.

(2) The mean values of SO_4^{2-} and NO_3^- of the summer rainwater of 1980 are 12 and 3.76 mg/l respectively; the pH is mostly 6-7. By comparison, the mean values of Tokyo, Japan in 1973-74 are 6.8 and 2.9 mg/l and the pH is 4.39. The rainwater of Beijing is heavily polluted but the acidity is not high. It is estimated to be the result of the high granule content of the air to neutralize the acids.

(3) The range of variation of pH is not great; the spatial distribution is not regular, and there is no correlation among the densities of ions. These conditions perhaps indicate that under the condition of high level of granules, the pH value is the result of complex action of many factors.

(4) There is a relatively good correlation between SO_4^{2-} and NO_3^- . Between SO_4^{2-} and NH_4^+ , although the correlation is good in the granules, in the rainwater they are radically not related.

(5) Among the ions tested this time, the total equivalent density of negative and positive ions cannot balance. The density of negative ions is much smaller. The precise reason for this situation awaits future investigation.

(6) The rainwater has been polluted by SO_4^{2-} and NO_3^- , which are also the important targets of regional environmental quality research. Moreover, what changes will occur to rainwater acidity when the air quality is improved (in the short term the improvement will be expressed in the form of reduction of granules)? For this reason, although at present there is yet no acid rain in Beijing, there remains a need of studying pollution chemistry of rainwater and the relationship between rainwater pollution and air pollution and the relationship between soil pollution and surface water pollution.

In Shanghai

Beijing HUANJING KEXUE (ENVIRONMENTAL SCIENCE) in Chinese Vol 2, No 2, 30 Apr 81
pp 54-56

[Article by JIANG Yanyin [3068 4282 0936], WANG Suyun [3769 4790 5366], CHEN Huihua [7115 1920 5478], YANG Chunlin [2799 2504 2651], QIAN Hua [6929 5478]

[Text] In recent years, as the result of atmospheric discharge of pollutants, the phenomenon of acid rain has appeared in a number of places in the world. In China, acid rain has appeared in Chongqing, but aside from Beijing, in most other places there have been no acid rain tests. There is no way to know whether the problem of acid rain exists. In order to clarify the condition in Shanghai, the authors began to analyze the acidity and the chemical composition of rainwater in Yangshupu District (a region of industrial concentration) and Luwan District (an area of relatively fewer industries.) This paper is the result of observation from March to August 1980.

Method of Experiment

Rainwater specimens are collected with the SMI collector and the quantity of rainwater collected in 24 hours is regarded as the rainwater of a day. After collection, the specimen is filtered through constant quality filter paper before the test. The instrument used to measure the rainwater is washed with ion-removing water before each rainfall to remove the fallen dust.

Before May, the PHS-29 A acidity meter is used to determine the pH of rainwater; after May, the PHS-3 acidity meter is used. Before testing, the specimen is stirred 2-3 minutes beforehand, then, it is left to stand for 2 minutes before the reading is taken. The content of sulfuric acid radical is determined by the barium sulfate turbidimetric method. For the total quantity of nitrate-nitrite, a Cu-Cd column is used to reduce the nitrate before the methylnaphthyl ethylene diamine nitrate colorimetric method is used for determination. The chlorine ions and the carbonate radical ions are measured with the silver nitrate titration method and the neutral titration method respectively. For the determination of ammonium ions, both the indophenol blue colorimetric method and the PNH_2 -1 ammonia electrode (produced by Shanghai Photoelectrical Instrument Plant) determination method are used for comparison. The results are uniform; therefore, the electrode method is a fast and reliable method of determining ammonium ions.

Experimental Results and Discussion

The test results of acidity, sulfate radicals, carbonate radicals, nitrate radicals,

chlorine ions, and ammonium ions of the 52 rainwater specimens collected from Yangshupu and Luwan Districts are presented in Table I and Table II.

The condition of variation of monthly average of rainwater acidity and that of monthly average of soluble ions are given in Figs 1, 2, 3, 4, 5, 6 (The solid line is for Luwan District and the dotted line is for Yangshupu District).

It may be observed from the test results that the pH of the rainwater in Luwan District of Shanghai remains above 6, aside from one occasion each in March and April when it is less than 6. In Yangshupu, the pH of the rainwater is above 6 in all the specimens. These results indicate that the precipitation in Shanghai is close to neutral. When Yangshupu District is compared with Luwan District, aside from the month of July the pH of the rainwater in Yangshupu District is higher than that of Luwan District. Among the atmospheric pollutants, sulfur dioxide and nitrogen oxide are acid substances; when they are oxidated in the atmosphere they are transformed into sulfuric acid and nitric acid and this is the major reason for the formation of acid rain. On the other hand, a large quantity of dust is alkali and it contains a number of alkali oxides which can cause the pH of the rainwater to rise. In Yangshupu, there is a concentration of industries and a giant quantity of dust bursts out of the chimneys of the factories. It appears that the effect of the dust on the pH of the rainwater exceeds the effect of sulfur dioxide and nitrogen oxide to cause the pH of the rainwater to be higher. The rainwater specimens of Yangshupu are often very turbid. After they are left standing, a large quantity of dust precipitates. The specimens are taken not far from the Yangshupu Power Plant and it appears that the effect of the dust discharged from the power plant is very great.

The soluble ion contents of the rainwater are obviously higher in Yangshupu than in Luwan District. to a very great extent (see Table III.) The content of chlorine ions is almost 20 times higher; those of sulfuric acid radicals, nitric acid radicals, carbonic acid radical ions are about 2 times higher. These facts indicate that due to the concentration of industries in Yangshupu, contents of these radicals are higher. Judging from the preliminary data thus obtained, although the atmospheric contents of sulfate radicals and chlorine ions in Shanghai are relatively high (SO_4^{2-} : 1.6-85 mg/l, Cl^- : 1.6-12 mg/l for Luwan District; SO_4^{2-} : 3.8-145 mg/l, Cl^- : 3.4-26 mg/l for Yangshupu District), their correlation with acidity is not discovered. In August, due to the continuous rain storms lasting almost the entire month, the density of the various ions drops obviously. This fact also demonstrates that the relatively high soluble ions in the rainwater are caused by atmospheric pollution.

6248

CSO: 5000/4075

MAJOR DIRECTIONS FOR EARTH SCIENCE RESEARCH PROPOSED

Beijing RENMIN RIBAO in Chinese 19 May 81 p 4

[Article: "Earth Science Research Should Emphasize Energy Resources, Natural Resources, Natural Disasters, Environmental Protection and Engineering"]

[Text] China already has a vast team in earth science research and has made outstanding research achievements. The mission of today is to actively take up important general topics in national economy and defense to contribute to the four modernizations. Director of the Earth Science Division of the Chinese Academy of Sciences, Yin Zanzun [1438 6363 8113], stressed this view in his work report to the Fourth Conference of Division Committees in the Chinese Academy of Sciences.

According to Yin, Chinese scientists have already made many outstanding achievements in earth science research, including creative theories and methods developed by Chinese scholars. The development in earth science has reached a new stage in recent years. The character and trend of the new status are the involvement of new technology, mathematics, physics and chemistry, the computerization, the multidisciplinary nature and the enhanced international collaboration. Earth science began as a descriptive science and advanced to an experimental science of precision observation and experimentation and quantitative numerical simulation. Therefore, researchers in earth science should adapt to these new characteristics, keep up with the trend of development and work on important technical topics.

In order to meet the needs of socialist modernization construction, said Yin, the emphasis of earth science research should be placed on five areas: energy resources, natural resources, natural disaster, environmental protection and engineering. The main objective is to propose theoretical understanding by revealing the laws of nature and to provide theoretical foundation and method for prediction evaluation, control and utilization in the field of earth science.

Yin said that, in promoting the development of earth science, we should perfect the division organization, strengthen the academic leadership, improve the experimental methods, actively adopt new technologies, while at the same time reinforce the team of scientific research. For middle-aged science and technology workers currently on the front line of research, their responsibilities should be increased so that they can fully develop their key role. Young talents in science and technology should be carefully cultivated to rejuvenate the research team.

For the near future Yin believes that the following research work should be emphasized: study of the earth crust diman [0966 1611], general oceanographic investigation, research on earth crust energy resources and geothermal energy, the formation environment and mechanism of mineral deposit, study of the origin and evolution of material, fundamental research on China's natural potential of agriculture resources and farmland ecology, atmospheric physics and dynamics, environmental pollution, engineering geology and the prevention of rock and mud flow.

9698

CSO: 5000/4073

BRIEFS

AUTO EXHAUST POLLUTION--An intensive campaign to control environmental pollution caused by vehicle emissions, especially mass transit, will begin today in the metropolitan region. The announcement was made at a press conference by Ramiro Cabero, regional secretary of the Ministry of Transport. Participating in the program will be 20 university students especially hired for the purpose. They will be in charge of inspections at data gathering points situated on the main mass transit lines in Santiago. The students completed a special training course to learn how to use the Ringelman map for the purpose of keeping track of vehicles in operating condition. They will later be assigned to different schedules and lines to see that vehicles entering the downtown area do not exceed maximum emission levels. Once the information has been evaluated and classified, the regional secretary will send to the Sanitation Court the list of violators with the maximum evidence possible in order to identify the vehicles named. Fines to be imposed on violators will range up to 24 living wages, which amounts to a maximum of \$24,318.96. Last year, 3,914 vehicles out of a total of 6,031 had to be repaired. Fines averaging \$6,000 were imposed on 400. The campaign underway will last about 4 months and it is thought that all vehicles will be inspected every week. The total cost will be approximately \$450,000. [Text] [Santiago LA NACION in Spanish 20 May 81 p 1] 11,464

CSO: 5000/2125

IMPORTED TECHNOLOGY, CONGESTION BLAMED FOR POLLUTION

Tehran KEYHAN in Persian 3 Jun 81 p 3

[Text] At a press conference given by the officials in charge of the Environmental Protection Organization, it was announced that the tripling of the population, imported technology and lack of cooperation by the people have resulted in air pollution in large cities.

At this meeting, the officials of the above organization discussed the activities of the Environmental Protection Organization, as well as the programs scheduled for the Environmental Protection Week.

At the opening of the press conference, Mirza Taheri, deputy prime minister and environmental protection supervisor, said, in relation to the duties of this organization: "As a model for its duties, the organization has set article 50 of the Constitution, related to the fact that 'in the Islamic Republic, environmental protection--which should be expanded in the present generation and the coming ones--is considered a common duty. Therefore economic and other activities, which may necessitate the pollution of the environment or irreparable damage to it, are forbidden.'"

Mirza Taheri added: "However, the environment has a philosophy and a series of duties, which consist of the protection of the natural and renewable legacies on the one hand, and the prevention of pollution of the air, the seas and rivers as well as the protection of wildlife and game on the other."

Later, in regard to the steps taken by the organization to protect natural resources, deputy Minister of Natural Environment Vahedi said: "Lack of cooperation by the people with this organization has resulted in the fact that our center has been unable to implement its duties as is needed, and as long as the people do not become aware of their role in the protection of these resources, the environment is in danger." He added that "the issue of protection is not to restrict or confine the country's natural resources, but how to derive benefits in a fair and logical way from all elements of these resources while the people are using them, so that no damage and loss be inflicted on them."

Afterwards, Moharram-Nezhad, an expert from the Environmental Protection Organization said, in relation to the causes of air pollution in large cities: "There are three principal reasons for this pollution: First, the extreme congestion of population; second, imported technology, and third, lack of cooperation by the

people. Proposals for the removal of this kind of difficulties have been presented, among them, for instance, the proposal that in order to prevent the extreme congestion of population, it is required that we provide for welfare and public health facilities in the nation's villages so as to stop people from moving to the cities."

At the end, Moharram-Nezhad, with respect to the nature of the people's cooperation with this organization, said: "We ask the people to drive private cars as little as possible by using public transportation; also, that they should try to stop the acceleration of air pollution by keeping their home furnaces clean."

CSO: 5000/5538

BRIEFS

MANICA PROVINCE REFORESTATION--More than 3.7 million trees have already been planted in Bandula, in the province of Manica, a little more than 100 kms from the Zimbabwe border. This operation is aimed at the reforestation of a vast region and is part of the initial operations constituting the important FO-1 Forestry Project. The project includes a number of industries to be established in the future, among them paper pulp plants and plywood factories, which will be the principal elements in the economic and social development of this border region. [Excerpt] [Maputo NOTICIAS in Portuguese 7 Jun 81 p 1]

CSO: 5000/5026

USE OF DDT PESTICIDE DEBATED

Necessary at Present

Salisbury THE HERALD in English 13 Jun 81 pp 6, 7

[Article by Lance Smith, Chairman of the Natural Resources Board]

[Text]

THERE has been very considerable anxiety and criticism expressed recently in letters appearing in the Herald and The Sunday Mail and in several editorials of these same newspapers concerning the use of the organo-chlorine pesticide DDT in Zimbabwe and I therefore believe it necessary to advise both the public and yourself of the Natural Resources Board's attitude in this very important matter.

The NRB has been deeply concerned for some while now about our continued use of DDT in the light of the adverse reports emanating from other parts of the world, mostly developed countries in temperate latitudes, several of which banned the use of this pesticide some years back.

Even more particularly though, it is concerned about the general misuse of pesticides and herbicides in this country, e.g. the spraying of monocrotophos (Nuvacron or Azodrin) at two or more times the rate recommended for aphid control, for which it is registered, along the outer fringes of croplands, in particular wheat, in order to kill quelea birds, which, of course, are a major problem in some wheat growing areas.

Unfortunately, however, the pesticide is not only lethal to quelea, but also to all the game birds such as guinea fowl and francolin as well as a host of other species of birds and as a result there has been a serious depletion of birdlife in some farming areas.

The unsupervised use of toxaphene and other poisons by some landowners to control jackals and other predators is another example of misuse. The carcasses or bait to which these chemicals are applied are frequently eaten or taken by birds of prey and vultures causing considerable losses amongst their limited numbers.

COMMITTEE

In view of these types of problems and other pollution hazards with which the country is becoming increasingly faced, the Board decided to reinstate its Environmental Conservation Committee in November, 1977, under the chairmanship of Professor G. Bond, vice-chairman of the Natural Resources Board. Other members of the committee were drawn from the Division of Biological Sciences, University of Zimbabwe, the Ministry of Health, the Division of Water Development, Ministry of Natural Resources and Water Development, and the Board itself.

The committee has considered pesticides and herbicide usage in Zimbabwe in some detail, in particular that of DDT, by taking evidence from local experts, both environmentalists and those persons who are responsible for the use of these chemicals. The preliminary findings of the committee are summarised in the summary and conclusions section of the committee's report entitled Interim Report of the Environmental Conservation

Committee which was presented to Government late last year, as follows:

"The problem of pesticide residues has been investigated at some length and in fair depth. Organochlorine residues are generally of long life and may have some insidious effects on the ecosystems by magnification up the food chains. The threat to man is negligible, but certain susceptible bird species may be endangered. The use in tsetse fly operations has been temporarily halted by events, but agriculture, especially cotton growers, still use DDT, but its use is diminishing. DDT is also used for malaria control.

"Short life organophosphorus insecticides are used increasingly and have been misused locally with serious ecological effects. They have also caused human fatalities by suicide and accidental overdosage. Disposal of contaminated containers is a problem. A new body, analogous to the Water and Air pollution boards could perhaps be set up to co-ordinate the monitoring of pesticide residues."

As has already been indicated in this summary which I have quoted, the matters of concern in the case of DDT are human health and the threat to wildlife, both of which are of considerable importance to us all. In the case of the former the consensus of medical opinion would seem to be that there is minimal danger.

The World Health Organisation Expert Committee (1973) stated that the only demonstrated effect on the general population of humans was the storage of its derivatives in the tissues and their excretion in urine and milk. They also stated that careful investigation of the largest available group of workers, who had been exposed for as long as 25 years to significantly higher levels of DDT than the general population, had not revealed any evidence that DDT caused cancer or any other obvious problem in man.

Dr L. Westwater, Deputy Secretary for Health and a member of the Board's Environmental Conservation Committee, has indicated to me that these findings are accepted by her Ministry.

However, as far as wildlife is concerned and particularly those birds of prey at the top of the food chain, there is a serious problem. The recent results presented by Mr W. R. Thomson of the Department of National Parks and Wild Life Management have brought this home even more forcibly as regards this country.

NOT PRACTICAL

But what is the solution? Immediate banning of the chemical? My Board and I do not think this is practical. As I have already mentioned DDT is used for limited but, at present, certain necessary purposes in agriculture (maize stalk borer and certain cotton pests), malaria control and tsetse control in this country.

In the case of the first mentioned use, the quantity used annually has dropped very appreciably over the past seven years, in fact by about two-thirds of the pre-1974 usage which, more or less coincides with when the registration requirements were instituted and for all intents and purposes its use is being phased out.

However, the Chief Cotton Research Officer in Gatooma Mr J. Gledhill, has said recently that its termination for use on cotton could not be immediate. I would also add here that it is likely that once phased out, the chemical would still have to be held at the ready in the pesticide arsenal in case of problems developing, as in the cases of the U.K. and the U.S.A.

In this context it is noteworthy that the United States Government has had to give permission since the banning for the aerial spraying of DDT over many thousands of hectares of forest in the State of Oregon in order to deal with a particular pest problem.

In the case of malaria control, the W.H.O. recommends DDT for this purpose. It has replaced BHC to the greater extent, its withdrawal would, I feel certain, put many people in the lower lying rural situations of Zimbabwe at risk to malaria, which would be quite unacceptable.

Anti-malarial spraying has been greatly intensified over the past year. The DDT is applied to the inside surface of walls of dwellings and therefore its escape into the environment from this source is relatively minimal. However, there is little doubt that the treated walls could provide a very ready source of contamination to humans through the touching of these before handling foodstuffs, etc.

As far as its use for tsetse control is concerned, DDT is currently the main weapon for control at this point in time in Zimbabwe.

The success of the Tsetse Control Branch of the Department of Veterinary Services' spraying operations is dependent on the insecticide being in position on the dry season resting and refuge sites of the tsetse fly at the onset of the hot part of the dry season, that is late September/early October and therefore one must use a residual insecticide, because it literally takes every bit of available time from 1st June to the end of September to cover the total area of country to be sprayed each year.

The only suitable alternative pesticide which could be used for this technique is the very much more toxic chemical, particularly to the operator and birds and fish, Dieldrin. Here, too, though, as in agriculture, research has been directed for some years now towards replacing the method. Firstly because of the environmental hazard of the killing agent employed (in which context it is noteworthy that Dieldrin was used from 1960 to 1962, inclusive), and secondly, because it has other practical drawbacks.

**"THE threat to man is negligible but certain
bird species may be endangered" (Report).**

including the necessity to turn off the grass cover prior to spraying, in order to ensure that the pesticide is not damaged after application by late season grass fires, and the need for almost continuous close supervision of the spraying teams, as they work over what is mostly very difficult terrain and under unfavourable climatic conditions, to ensure that the pesticide is correctly placed.

The research work of the Pesticide Control Branch has proceeded steadily forward to the point where it now has two promising methods in the pipeline.

ODOURS

The first involves the sterilisation of wild flies after attracting them in large numbers by attractive odours and it is noteworthy that its efficacy is currently being put to the test in a field trial which was launched on an island in Kariba on April 1 of this year.

The second method is a ultra-low-volume or ULV application of the pesticide Endosulfan by fixed wing aircraft operating at night. Further trials of this method are being planned for next dry season.

However, even in the event of one or both of these techniques being perfected tomorrow, it would take several more years before one or other, or both, could be adequately applied in the field to replace the control which has been effected in Zimbabwe so very successfully with DDT, to date.

It is also likely that in the final event spraying with DDT will continue to be used on a limited basis, in conjunction with the new methods, if these

prove to be a success, in those more difficult situations with which the pest-control entomologist is confronted from time to time.

And before moving on from here I must emphasise that currently the Pesticide Control organisation is endeavouring to contain serious advances of pests which developed during the war years. There are many thousands of head of cattle at serious risk and these must be protected.

The Natural Resources Board must obviously consider the matter quite dispassionately from the point of view of what is best for the country as a whole. It has discussed the matter at length with the various responsible authorities, including the Parks and Wild Life Board, the Ministry of Health and the Ministry of Agriculture through both its Environmental Conservation Committee and directly, and it has been reluctantly accepted that DDT is necessary for the purposes described above at this point in time.

However, it is encouraging that in general the picture is one of a phasing out to minimal use, except possibly for health purposes and I have clearly got the impression that most entomologists of any standing are genuinely sincere in their endeavours towards this objective.

PICTURE

In conclusion, the Natural Resources Board intends to ensure that the following is carried out:

● That the capacity of the monitoring unit, which the Department of Research and Specialist Services set up about eighteen months ago, to monitor on a continuing basis, the level of pesticides and their break-

down products in the environment on a country-wide basis, is sufficient to deal with the sampling necessary to achieve this objective, in order that it can provide a clear picture of what is happening within our environment in relation to pesticides and herbicides in general.

There has been some criticism that this was not the case and therefore it is pleasing to be able to report that following a meeting between the Minister of Agriculture, myself and Government officials several weeks ago, I feel sure that sufficient funds will quickly be found to provide the additional equipment and other requirements which this unit requires to put it in a position to ensure its effectiveness.

● That the committee which guides this monitoring unit adopts a more positive role than hitherto and, here too, it is pleasing to note that at the meeting referred to above, the Minister of Agriculture gave instructions that this committee was to be made more formal and representative as soon as possible.

● That there is very much greater supervision of the sale and use of pesticides and herbicides (some form of inspectorate may have to be set up), and in this context it is noteworthy that at the same meeting referred to twice above, it was decided that DDT would shortly be elevated to the Purple Triangle label category, which means that once the necessary regulations, in terms of the Hazardous Substances Act, are gazetted, it will only be possible to purchase this pesticide from properly authorised dealers and more particularly, only after signing the poison register.

'Not Vital Pesticide'

Salisbury THE HERALD in English 13 Jun 61 p 7

[Text]

THERE is no reason why DDT should be used in agriculture in Zimbabwe, the managing director of a pesticide distributing company Mr Mike Reinders, said in Salisbury yesterday.

Mr Reinders said less than 300 tonnes of DDT was being used in agriculture each year, most of it by small-scale farmers to control cotton pests.

"In value DDT forms a very small percentage of the total pesticides used

in the country each year. Alternatives such as synthetic pyrethroids are available locally at less than 15 percent increase in cost," he said.

"However, if they are not carefully used their effectiveness may be lost quickly by a buildup of resistant pest populations." Mr Reinders warned.

He said the use of DDT by farmers had been progressively restricted by legislation but more than twice the amount used in agriculture was being applied by Government

departments to control tsetse fly and malaria-carrying mosquitoes. Alternatives were not so easily or cheaply available.

Mr Reinders also said his observation of a reduction in the numbers of fish eagles and other raptors at Lake Kariba supported views expressed recently by Mr Ron Thomson, of the Department of National Parks and Wildlife Management, that DDT posed a threat to wildlife.

CSO: 5000/5025

GOVERNMENT PUSH FOR WATER DEVELOPMENT REPORTED

Salisbury THE FINANCIAL GAZETTE in English 5 Jun 81 p 4

(Text)

THE Government's plan to provide potable water to all Zimbabwe's people could take between 20 and 30 years and cost as much as \$600 or \$700 million dollars.

The Ministry of Water Development has already started a number of pilot schemes throughout the country and will expand the programme as and when the money becomes available.

Essentially, the water development plan calls for rural centres or growth points scattered throughout Zimbabwe where the Government will dig boreholes and instal power pumps. The aim is to attract the millions of Zimbabweans who are scattered in individual families throughout the country to congregate either in these rural centres or growth points. Originally, the rural centres or growth points will only provide communal borehole facilities but eventually, water might be pumped to individual homes at a cost to the homeowner.

DAMS

In areas where there is insufficient subterranean water, Government will build dams and treatment plants and pipe the water in. In some cases, the water might have to be piped 20 to 30 kilometres. There is a survey currently underway to see which existing dams are under-utilised and these will be incorporated into the water development schemes.

Much of the money for water development will come from funds promised at the ZIMCORD Conference. Water development is an integral part of the Government's reconstruction and rehabilitation programmes and some money could be made available from funds for related projects such as health care and education.

MODEST

For the moment, however, Government's efforts are rather modest due to limited funds. But there are

a number of projects underway in all of Zimbabwe's provinces and negotiations with international aid agencies have been undertaken to obtain more funds and expert advice.

The first major water development projects, which should get underway in September or October, will cost about \$7 million and provide 90 sources of water in six growth points. In addition, there are plans to pipe water to two locations. The project is being financed by the African Development Bank.

The major problem facing the Ministry is the lack of technology — much of the material and equipment needed for the project can be manufactured locally — but of suitable manpower. The Ministry is simply not equipped to handle such a huge project and the problem has been aggravated by the loss of skilled staff. As a result, the Ministry is hiring consultants to do much of the leg work.

GREATER EMPHASIS ON ENVIRONMENT PROTECTION SOUGHT

Nicosia CYPRUS MAIL in English 9 Jun 81 p 1

[Text] The Cyprus government has decided to reinforce the Environmental Protection Service at the Ministry of Agriculture and Natural Resources, the Minister, Mr N. Pattichis has said.

Speaking during the weekend at the annual Congress on the Natural Environment at Limassol, the Minister said that development and technological expansion are necessary elements for the progress of mankind but when they cause destruction of the natural environment they must be regarded as enemies of man.

Unfortunately, he said, air pollution of the shores, the forests and the landscape, the elimination of wildlife and other similar harmful acts are beginning to appear ominously in Cyprus as well.

"We have a duty to deal with these things in time and in a rational manner, for our own benefit, for the benefit of our fellow man," the Minister said.

The Cyprus government, he said, realising the significance for the country of the preservation of the natural environment has enacted a number of measures like control of natural development, protection of forests, of wildlife, water resources, etc.

The Minister emphasised that the government effort cannot achieve its aim without the cooperation and support of the public and of organised groups.

CSO: 5000/5540

ATHENS 'SMOG,' ANALYSIS, STATISTICS PUBLISHED

Athens BUSINESS & FINANCE in English No 145, 6 Jun 81 pp 2, 10

[Text]

Swallows are the messengers of Spring. Their presence gave joy to the inhabitants of Athens, and for the children in particular, their coming was a festive event. But now all this belongs to the past. In 1979, for the first time, the swallows left Attica, and didn't return. And by their absence, this time, they became the messengers of something far from joyful ... the messengers of one of the most dangerous manifestations of pollution in Athens - the infamous Athens 'smog cloud'.

Within a fairly short period of time, and actually on October 6th 1979, a heavy, dark-coloured cloud appeared in the once-blue Athenian sky, causing stinging in the eyes, headaches, and respiratory problems for part of the population, and in particular, those who were in generally poor health. This date marks a day in the history of Athens, as it will remain as the formal date of birth of the infamous monster.

It quickly took first place in the local press, over other economic and political events, such as inflation, the elections, the visits of foreign heads of state, crime. Nearly every week, huge headlines 'hymned' the blanket of smog which was threatening (and continues to do so) every aspect of the quality of life in the capital. "...Yesterday, the cloud broke the upper safety limits ...

Pollution double the levels of the EC and the USA The cloud is a killer Urgent need for measures to be taken..... Levels of 7 photometric units instead of the safety limit of 3.....etc."

The blanket of smog was not a single event, but a periodic one. Ten days later, it re-appeared, and covered Athens for about 80 hours. It was at this time that the public became alarmed, and the systematic reporting of the phenomenon was started. Many professors and scientists gave interviews, pointed out the dangers, compared in to the similar clouds of Los Angeles and London, gave warnings, and condemned. There seemed to be alarm in all quarters, except one - the Ministry of Social Services. Scientists, such as those of the Pan Hellenic Movement for Ecological Research (PHMER), raised their voices in a call for drastic measures to be taken. The State, on the other hand, displayed a totally unjustifiable optimism that the monster would, simply get bored, go away, and leave us alone.

On January 14th, 1980, PHMER made the dramatic announcement that the life of Piraeus was in danger, from the continuous pollution of the atmosphere, and that measurements showed that the rates of the various pollutants were five times greater than the internationally acceptable standards. But the Ministry of Social Services replied that 'The rate of pollutants does not exceed the international standards'.

On February 27th 1980, PHMER announced that Nikea had levels of atmospheric pollution 2-4 times greater than the acceptable limits as specified by the EC. And the Ministry replied that the pollution of Nikea did not exceed the EC standards. Then the 6th

Table 1: Percentage participation of the sources of pollution in the Athens area

Source	carbon dioxide (%)		suspended particles		carbon monoxide		nitrogen oxides		hydrocarbons	
	winter	summer	winter	summer	winter	summer	winter	summer	winter	summer
Industrial activity	10	11	95	96	3.2	3.0	63	65	14	14
Use of fuels in industry	39	43	1	1	0.6	0.6	12	13	2	2
Keratsini PPC Station	34	37	-	-	-	-	7	7	-	-
Traffic	8	9	3	3	96	96.5	14	15	83.3	84.0
Central heating	9	0	1	0	0.2	0	4	7	0.7	0

Medical Congress in May 1980 announced that the 'pollution in the Athens area kills more and more people every day'. But this too was rejected by the Ministry of Social Services, with another announcement on June 11th 1980: "For the time being, the cloud creates no problems for the public health."

On October 19th, PHMER made the totally unexpected discovery that special instruments for the measurement of atmospheric pollution were hidden, and unused at the University of Athens. At this point it should be said that the cloud over the Athens area is not

a completely phenomenon. Its first appearance dates back as far as 1964, and this has been proved by the photographs taken by scientists at that time, who underlined the danger. But in vain. Even the most basic measure, that of scientific research of the phenomenon, was not undertaken. The phenomenon did not seem to interest the Ministries. It was necessary for the pollution to reach the recent totally unacceptable limits, it was necessary for the cloud to frequent and dominating in its appearance, before the officials listened to the scientists, and proceeded to take some short- and long-term measures.

But to return to the cloud, its 'invasions' were frequent all through the autumn of 1980, and on October 17th, 1980, it launched its general attack. The sulphur dioxide content was double the acceptable standards. The case was the same for nitrogen. It was only then that the Ministry agreed that "Yes, the pollution has increased." But it was too late. The general attack was repeated on 24th November. This time, the pollution level was higher than that of Los Angeles. In Athens, there were 486 mg of nitrogen dioxide per cubic metre, compared to 470 in the American city. This was its 25th appearance, and the most intense since October 1979. The announcement of the scientists that cases of lung cancer had quadrupled in the Attica basin in the last decade made a great impression on the public, but the Ministry, absorbed in its struggle against smoking, replied again: "There is no danger to the public health."

Table 2: Industrial oil consumption in various areas of the Attica basin (tons / year)

Keratsini	1.075.000
Nikea	
Moshato	13.000
Kalithea	
Rentis	22.000
Tavros	6.000
Votanikos	71.000
Peristeri	9.000
Egaleo	
Patision	20.000
N Philadelphia	
N Ionia	
Metamorphosis	
Likovrisi	

The cloud this time had the courtesy to remain over Athens for three continuous days, and quite suddenly, and for the first time, the Ministry announced that "The cloud is a danger. Reduce the use of central heating, and the use of cars."

Later, pollution reached 5.3 photometric measures - that is, five times more than the safety limits. This attack lasted for four whole days. After that, its aggressiveness seemed to decrease. It continued to make an appearance now and then, but it was not so strong. This, of course, was not because of any efforts on the part of the government to do anything about the situation - far from it. It was due exclusively to the caprice of the monster. This proved true when it so vigorously attacked again on February 19th 1981. And so the story continued, until the people of Athens demonstrated on April 22nd 1981, indignant at the long-term indifference of the government, and yelled furious slogans at both the government and the monster.

If this 'monster' is not in fact a plague sent to the people of Athens, then what is it? Scientists say that it is a concentration of various pollutants in an atmospheric area, and this seems to be the truth, as in the Attica Basin there are 500,000 cars, which send out tons of gas fumes; there are 1,000,000 buildings with the same number of chimneys, sending out sulphur dioxide, nitrogen oxides, and other pollutants; there are 50% of the total number of industries in Greece, which offer us their smoke, suspended particles, sulphur dioxide, carbon monoxide, hydrocarbons, etc. In summary, the Athenian atmosphere receives each year, some 130,000 tons of carbon dioxide, 4,000 tons of smoke, 20,000 of nitrogen oxide, and thousands of tons of other pollutants.

There can be no doubt that all the sources contribute to the pollution, and that the blanket of smog is the product of a long-term indifference concerning the organised and sophisticated development of the area of Athens, an area of 3,500,000 inhabitants. As has already been mentioned, the phenomenon has been in existence since the mid-sixties, but then it was troublesome only for the industrial areas of Elefsis, Keratsini, Kifissou, and Tavrou. Gradually, the increase and expansion of industrial activity, and later the increase in the number of cars in the city centre, the phenomenon ceased to be a local one, and began to bother the Athenians also, until it became a major problem.

The general attitude that the Ministries adopted for coping with the problems, of 'waiting till the glass overflows', is reflected also in the gradual pollution of Elefsis, of Pagassitikos, of Thessalonika, and the other gulfs, which now, and for many years, have been receiving the wastage from the non-existent programming for the industrial areas, in the construction-chaos in Athens, the lack of roads, the lack of plants, the lack of parks, etc.

And the glass that contained all these evils, did indeed overflow. And at this very moment, as we launch our verbal attacks on the monster, there are still no exact measurements of all the pollutants, there are no exact facts known of the possible deaths caused, there is no continuing research, and so the question of whether the smog cloud is a danger to the public health or not, is answered by the uninformed opinions of each politician, or public servant.

For the correct measures to be taken, the phenomenon must be thoroughly studied, and this can be done by those scientific specialists whose number in Greece at the present time, is insufficient. At this moment, the measurement grid has only eleven permanent stations, and furthermore, not all the boundaries are taken into account. How is it possible, (the government has taken some measures), for the correct measures to be taken, if the exact definition of the contribution of industry to the pollution is unknown? If there is not even a systematic compilation of meteorological data?

Necessary preconditions for any cure, for any realistic coping with the problem of the pollution in the Athens area, and in Greece generally, is to have exact information on the distribution of the sources of the pollution, and the quantity of the transmitted pollutants, the organisation of a grid for the measurement of the photochemical pollution, the organisation of an appropriate mechanism which will impose an immediate reduction of the transmission of pollutants (industry, traffic, etc) for the time-period in which an increase in pollution has been forecast, and all the other long-term measures with major restrictions in industry, improvement of the traffic circulation, the use of good-quality fuels, etc.

Recently in Athens, the 9th Medical Congress took place, during which the atmospheric pollution was described as one of the main crises of our society, and the unfavourable effects on the public health were emphasised. There is no doubt that their instincts were correct when the swallows left Athens for the last time. Perhaps it would be wise to follow their example. But it would be far wiser, late though it may be, if we tried to make the Athenian skies clear, and hospitable once again.

ATMOSPHERIC POLLUTION IN THE ATHENS AREA

IN the Athens area today, the greater part of the urban, industrial, and economic activity of Greece is concentrated. There are about 3½ million inhabitants, 400,000 vehicles, and 51% of Greek industry.

From these activities, - industry, traffic, central heating, - a variety of pollutants are sent into the environment. The most important of these substances are sulphur dioxide, suspended particles, smoke, oxides of nitrogen, carbon monoxide, and lead. Under the influence of the sun's rays, and reactions between hydrocarbons and oxides of nitrogen, other secondary pollutants are formed - photochemical oxidisers and ozone.

The percentage seasonal participation of the main sources of pollution in Athens can be seen in Table 1. From this table, it can clearly be seen that industry, and the hydroelectric station of the PPC produce the highest percentage of sulphur dioxide, suspended particles, and oxides of nitrogen. Traffic produces the higher percentage of carbon monoxide and of hydrocarbons. Central heating systems, on the other hand, produce only 9% of the sulphur dioxide, and 1% of the suspended particles, and only during

the winter. Nonetheless, the concentration of apollutant in particular area of Athens depends on the participation of every source in the area - industry, traffic, central heating systems, et al.

In densely populated areas, therefore, far from the industrial areas, (the centre of Athens, and the eastern part of the basin for example), the main sources defining the concentration of the pollutants must be the traffic, and the central heating systems during the winter. However, pollutants such as sulphur dioxide can easily be transferred over considerable distances. It has been found that the sulphur oxides in the atmosphere over the Scandinavian countries originated in the industrial areas of Britain and Holland.

There are many areas of mixed use in the Attica Basin (ie both industrial and residential). The industrial activity extends along a north-south axis: Keratsini-Nikea-Moshato-Rentis-Tavros-Votanikos-Peristeri-Egaleo-Nea Philadelphia-Nea Ionia-Metamorphosi-Likovrisi. Table 2 shows the consumption of oil in the industries of these areas. Obviously, some percentage of the pollutants of these areas comes from these industries. The 'cloud' has often localised itself over this axis, with its centre in the area of Tavros.

Primary pollutants

a) **Sulphur dioxide** - This comes from the combustion of liquid and solid fuels, the sulphuric acid industry, refineries, fertiliser industries, etc. It is estimated that about 160,000 tons of sulphur dioxide is sent into the atmosphere of Athens every year. Sulphur dioxide is a strong irritant of the respiratory system, particularly affecting young children and the elderly. It also reduces visibility, causes damage to the vegetation, and corrodes archaeological monuments, marble, steel, etc.

b) **Suspended particles** - The main sources of these are combustion, and such industries as steel-mills, cement industries, etc. In the Athens area, it is estimated that 275,000 tons of suspended particles are released into the atmosphere each year. Their main effect on humans is the irritation of the respiratory system.

Table 3: Concentrations of pollutants in the atmosphere of Athens, and international upper permissible limits

	Concentration		Standards
Smoke	0,41-2,33 COH/1000	(1)	-
Suspended particles	117-243 μ g/m ³	(1)	40 μ g/m ³
Lead	0,26-4,1 μ g/m ³	(1)	0,7-1 μ g/m ³
Sulphur products	11-18 μ g/m ³	(1)	6,5-13 μ g/m ³
Nickel	0,045-0,145 μ g/m ³	(2)	-
Dust	72-196 TON/Mile.Month	(3)	100 TON/Mile. Month
Sulphur dioxide	34-112 μ g/m ³	(1)	60-80 μ g/m ³
Ozone	20-40 μ g/m ³	(2)	120 μ g/m ³
Nitrogen dioxide	240 μ g/m ³	(4)	200 μ g/m ³

(1) Annual average rates

(2) Average rates from the total measurements

(3) Tons per square mile per month

(4) The upper indication of 24 hour measurements

c) **Carbon monoxide** – This is the result of the incomplete combustion of organic substances. Vehicle exhaust fumes contribute about 10% of the total amount. Other sources are oil refineries and steel mills. Carbon monoxide is radiated in the atmosphere in quantities far greater than any other pollutant. It is estimated that in the USA in 1968, of a total of 214 million tons of pollutants, 100 million tons (i.e. 46.7%) were carbon monoxide, and of this, 60 million tons came from cars. Carbon monoxide reacts with the haemoglobin 200 times faster than oxygen, and causes insufficient supply of oxygen to the tissues. It is of considerable importance to note here that small concentrations over a long period of time cause disturbances to the nervous system, damage the sight, and have disastrous effects on car drivers.

d) **Lead** – This comes mainly from the combustion of benzine, and from industries such as the paint industry, batteries industry, etc. In the USA in 1968, it is estimated that the total amount of lead radiated was 186,000 tons, and the greater part of this was caused by the traffic. Lead in the atmosphere enters the organism through the respiratory system, or through the consumption of contaminated food or water. It dissolves in the blood, and affects various organs – the kidneys, the liver, and in particular the bones. It destroys the red corpuscles, thus affecting the production of blood, and the kidneys, and the nervous system.

e) **Hydrocarbons** – These can be classified as pollutants as they play a role in the photochemical process, and in this way create aldehydes and photochemical oxidisers.

Secondary pollutants

a) **Oxides of nitrogen**. – With this term, we mean mainly nitrogen oxide, and nitrogen dioxide. The main sources for nitrogen oxide are traffic, industry, and central heating systems. Nitrogen dioxide is formed from nitrogen monoxide after a series of photochemical reactions. The presence of nitrogen dioxide is closely related to urban activity and solar energy, and is therefore most often present during the summer.

b) **Photochemical oxidisers (ozone, PAN)**. – Ozone is a natural component of the atmosphere at a low percentage, but it reached a concentration of 430 μ g/m³ in the Los Angeles smog. It causes a burning sensation in the eyes and on the skin, and damages plants. Over the last decade, there have been systematic studies conducted to define the influence of oxidisers on the death rate, the increase in respiratory diseases, the reduction of physical abilities, and the increased incidence of eye and skin diseases.

THE ATHENS SMOG

THE appearance of the blanket of pollution over Athens is a result of the accumulation of pollutants during days or hours of dead calm (no wind) and temperature inversion. The suspended solid and liquid particles, and the nitrogen dioxide, reduce visibility in the atmosphere, and produce the well-known 'cloud'. The degree of danger of the cloud basically depends on the levels of concentration of the pollutants in the days or hours that they are there. The danger increases when these are concentrated over residential areas. Statistical analysis of the concentrations of sulphur dioxide and suspended particles shows that these do have an effect on the health of the citizens of Athens, although not necessarily only when the cloud is present.

As mentioned earlier, the presence of the cloud is the result of a combination of dead-calm, and temperature inversion, which concentrate the pollutants, and create the blanket. There is a need therefore for a study of the frequency and the characteristics of temperature inversion in Athens. Unfortunately, measurements with radio-soundings are taken only at Hellinikon Airport, which is too far from Athens to be completely useful.

From continued measurements of temperature at five points of the basin of Attica, and at different heights, (by PHMER), the following conclusions were drawn:

Temperature inversion at height of between 100-300 metres is very frequent during the first hours of the day (0 200-04 00). Temperature inversions at a height of 0-100 metres, however, are frequent during the afternoon hours. Another important element is their duration. Inversions that last longer, are more dangerous. During the summer, there are temperature inversions at a height of 0-100 metres, on 2-5% of the days, which last up to 53 hours, and in winter up to 18 hours. About 2% are inversions at 100-300 metres, with a duration of 37 hours. It is the inversions at a height of 0-100 metres that are the more dangerous. Generally speaking, there are about 18 days in the year with inversions of a duration of 17-53 hours.

However, the cloud is not a new phenomenon. Its first appearance over Athens dates back as far as 1964 - there are photographs taken by scientists during the years 1964-66, in which it appears. In the winter of 1972/73, there were 8-9 occasions on which a black cloud covered the centre of Athens.

The dullness of the Athenian atmosphere has been systematically studied over the 20-year period from 1953-1972, with measurements from the National Observatory. On 30% of these days, there is considerable dullness, and this has been attributed to meteorological conditions, of high pressure, and slack winds. The cloud which appeared over Athens in October 1979 was certainly the result of the concentration of pollutants due to the dead-calm, and the temperature inversions.

According to the observations of the Environmental Pollution Control Project, Athens, (EPCPA) (readings from the thermographs in five different positions in Athens, and at different heights), the blanket of smog was at a height of 100-300 metres, between two temperature inversions. On these days, no particularly high concentrations of pollutants were observed, except for smoke. Nonetheless, the concentration had increased.

According to these statistics, the conclusion could be drawn that the blanket was not in fact dangerous. However, given that the EPCPA grid of testing stations is inadequate, and that in fact it hardly measures at all the pollutants of the photochemical variety, such a conclusion, i.e. that the cloud of October 1979 did not have any ill effects on the health of the inhabitants of Athens, cannot, in fact be drawn.

However, it can be concluded that there is insufficient observation of the atmospheric pollution in Athens, and that efforts must be made to reduce it. There is no reason to believe that the burning sensation in the eyes, and the respiratory difficulties noticed when the blanket appeared in October 1979, was not the result of photochemical pollution.

**Table 4: Pollution in the Athens area
for the period 15th-20th October 1979**
Station average rates. ($\mu\text{g}/\text{m}^3$)

Date	15-16 Oct.	17 Oct.	18 Oct.	19 Oct.	20 Oct.
Pollutant	Monday-Tuesday	Wednesday	Thursday	Friday	Saturday
Smoke	2,10	2,50	1,95	1,47	0,95
Sulphur dioxide	72	50	42	38	26
Suspended Particles	436	420	329	320	244
Nitrogen dioxide	160	160	255	90	87
Ozone (Patision)	—	18	15	15	17
Ozone (Rentis)	—	84	34	—	—

REVIEW OF THE STUDIES CONDUCTED

THE overall study of the atmospheric pollution of Athens began with the measurement of the pollutants in 1963. During the period from 1963-1967, the group led by G. Alevizatos measured concentrations of various pollutants, and mainly of sulphur dioxide and smoke. Measurements of sulphur dioxide were conducted from 1967, by scientists of the National Observatory of Athens.

As of 1972, the Environmental Pollution Control Project of the Ministry of Social Services and of the International Health Organisation, has measured the concentrations of sulphur dioxide, suspended particles, smoke, nitrogen, dioxide, ozone, lead, nickel, sulphuric acid, and dust. The concentrations of these pollutants is shown in Table 3, with the international standards. It is this comparison of the concentrations in Athens with the international standards, that indicates the gravity of the atmospheric pollution in Athens.

There have not as yet been any systematic measurements of photochemical pollutants in Athens, so it is impossible to estimate the extent of the pollution from photochemicals. However, some indication of their frequency and intensity can be arrived at by considering data taken up until 1975. This estimate was based on a comparison of all the necessary conditions for the formation of this kind of pollution in Athens, and in

three other cities (Melbourne, Sydney, and Los Angeles), where systematic measurements have been taken. These conditions are the number of vehicles in circulation, the average daily consumption of fuel per square kilometre, sunshine, dead calm, and temperature inversion. The conclusion of the study was that the formation of photochemical smog in Athens was very probable.

On those days when there is a higher concentration of pollutants, there are more symptoms of harmful effects on the health of the people. Analysis has only been made of the effects of sulphur dioxide and suspended particles:

Sulphur dioxide — The first signs of the effects of sulphur dioxide on the health of the people, occur when concentrations exceed $250 \mu\text{g}/\text{m}^3$. These effects are a general deterioration of the overall health, and an increase of the incidence of respiratory disease. In some areas, the percentage of the days with concentrations of sulphur dioxide greater than $250 \mu\text{g}/\text{m}^3$ amounted to 4.3% (16 days a year). On Academias Street, and Ippokratous Street this was 13.5% (50 days in the year). Concentrations greater than $500 \mu\text{g}/\text{m}^3$ occurred on 11 days in the Lofos of Nimfon, and 33 days in the area of the U University.

Suspended particles — Table 4 gives a picture of this particular form of pollutant. Concentrations greater than $200 \mu\text{g}/\text{m}^3$ can cause increased absences from work, while concentrations greater than $300 \mu\text{g}/\text{m}^3$ can cause a sharp increase in the occurrence of respiratory diseases such as bronchitis.

Table 3: National Standards of Quality of the air in the USA ($\mu\text{g}/\text{m}^3$)

Pollutant	Primary Standards*	Secondary Standards**
Sulphur dioxide		
Mean Annual rate	80	60
24 hours upper limit***	365	260
3 hours upper limit	—	1300
Suspended particles	—	—
Mean Annual rate	75	60
24 hours upper limit***	260	150
Carbon monoxide		
8 hours upper limit***	10.000	10.000
1 hour upper limit	40.000	40.000
Oxidizers		
1 hour upper limit	160	160
Nitrogen oxides		
Mean annual rate	100	100
Hydrocarbons		
3 hours upper limit (6-9)	160	160

* The Primary limits define the levels of pollutants in the air which are necessary with satisfactory security factor, for the protection of the Public health.

** The Secondary standards define levels of pollutants in the air which are necessary for the protection of the Public health from all known and suspected negative effects of a pollutant.

*** Must not occur more than once a year.

Table 4: The concentration of suspended particles

Sampling station	Number of days with concentrations	
	greater than $200\mu\text{g}/\text{m}^3$	greater than $300\mu\text{g}/\text{m}^3$
Syndagma Square	110	11
Ministry of Social Services	270	90
Amalias	300	10
Drapetsonas	200	36
Renti	200	55

Time-cycles of the pollution.

- a) Daily cycle-industrial and urban activities are far greater during the day than at night.
- b) Weekly cycle-the reduction of activities on Sundays and other holidays reduces the pollution by about 10-20%.
- c) Seasonal cycle - This cycle is related to the repetition of meteorological changes during the year, and to the seasonal increase or reduction of activities. Pollution is more intense during the winter, as there is a reduction of activity in the summer, and the use of central heating is an additional factor in the winter.

Peak Events

The term 'peak event' is used to describe the phenomenon when the concentration of pollutants is much higher than the ordinary concentrations in an area. Excluding the occurrence of industrial accidents, peak events always are the result of particular meteorological conditions, and in particular, temperature, increases with the altitude instead of decreasing, resulting in a heavier, and colder layer of air than the one above it. This is a regular phenomenon, and happens every evening after sunset. However, the problem arises when its duration continues for some days (usually from 3 to 8 days.) Temperature inversion is often related to the movement of air-masses from areas of low pressure to areas of high pressure, as for example, with warm air-masses moving over from Africa and hanging over Athens. These inversions often occur in Athens because of the topography, the combination of mountains, hills, and sea creates warm currents at a fairly high altitude, or cold currents at a low one.

Temperature inversion creates a stationary atmospheric layer, where air movement ceases. When this lasts for some days, there are extremely high concentrations of pollutants. All the manifestations of the 'cloud' have been related to inversions with a duration of between 3 and 8 days. There are two well-known types of pollution differentiated by the

kind of pollutant

a) **London smog** - This is characterised by a very high concentration of sulphur dioxide and smoke. It got its name from the black smog of London of 1952, when there were 4,000 deaths more than the average, affecting both people and animals. Most of these deaths were due to bronchitis (39%), other respiratory diseases (17%), heart diseases (20%), and the whole population suffered a general deterioration of the health. The event lasted for 5 days, and the concentration of sulphur dioxide and smoke reached the levels of 4,000 $\mu\text{g}/\text{m}^3$.

b) **Photochemical smog** (of Los Angeles)
- Photochemical pollution is a phenomenon completely different from London smog, and is characterised by high concentrations of secondary pollutants which are produced through photochemical reactions of primary pollutants. The primary pollutants are carbon monoxide, the hydrocarbons, nitrogen monoxide, and nitrogen dioxide. The secondary pollutants are ozone, PAN, and aldehydes. The conditions under which photochemical pollution is created are intense sunshine, high pollution from traffic, and finally the topography of the area, which encourages temperature inversions, even in the summer. Photochemical smog, in colour, shows a gradation from yellow through to brown, reduces visibility, irritates the eyes, throat and respiratory system, and damages plants. As this is a relatively new phenomenon, its total effect on the health has not as yet been determined.

Determining the quality of the air.

The criteria for determining the quality of the air are descriptive in their nature. They describe what the possible results are expected to be should the concentration of a pollutant in the atmosphere reach or surpass a definite level for a definite time period. The criteria are re-adjusted every time that scientists find new information. Today several large international organisations (World Health Organisation, etc), have formed

tables of criteria to determine the quality of the air for certain special pollutants such as sulphur dioxide, suspended particles, nitrogen dioxide, carbon monoxide, photochemical oxidisers, and hydrocarbons. The relation between the human reaction and atmospheric pollution is neither simple nor fully known. When using criteria of quality of the air for estimating the dangers and preparing standards of quality, it would be useful to have the exact relation between the quantity of pollutant and the human reaction.

However, this is not the case for any of the various pollutants. All that can be said is that it has been proved the certain concentrations of pollutants are related to unfavourable effects on human health.

Starting with the inaccuracy of knowledge of the relation between the quantity of pollutants and the reaction of the human organism, a security factor must be used in the preparation and definition of the standards of the quality. This security factor depends on many things, but it is also clearly subject to the influence of politics.

MEASURES TO BE TAKEN

Concerning the observation grid of the atmospheric quality of the area of Athens, there are eleven permanent stations, and one mobile, which measures some of the parameters. But 1) Not all the parameters are measured at every station 2) There are no criteria for the selection of the area of each station, and it is therefore impossible to consider the measurements as truly representative of each area. 3) The methods of sampling and the instruments used are adequate for only certain parameters. Sampling is unsatisfactory for ozone. 4) For some parameters, the grid is inadequate (for suspended particles for example) and does not cover such areas as Egaleo, Nea Philadelphia, Nea Ionia, and Ag. Anargiri, where industries are located 5) The grid does not measure concentrations of carbon monoxide 6) The grid does not adequately define the contribution of industry to the pollution of the Athens

area. 7) The grid does not measure the concentration of hydrocarbons 8) The subject of photochemical pollution, and the measurement of photochemical pollutants has been completely ignored.

Because of the dimensions that the pollution problem in Athens has acquired, a far more systematic organisation of the research on this sector must be undertaken. This should include:

a) A grid for the measurement of photochemical pollution, to be established as soon as possible.

b) The measurement of suspended particles, sulphur dioxide, and nitrogen oxide should be extended in the Athens area to include areas close to industries, thus to establish the contribution of the industries, and take such measures as are necessary for these to reduce their transmission of pollutants.

c) At the same time, there must be the systematic collection of meteorological data for the area. This mainly concerns the frequency of the occurrence of temperature inversions, and dead-calm in the Athens basin, as the measurements of temperature inversions at Hellinikon are not representative of the whole Athens area. The second stage of this would concern the ability to forecast the formation of a 'smog cloud'.

d) Finally, systematic research must be undertaken to evaluate exactly the effects of atmospheric pollution, and particularly photochemical pollution, on the health of the population.

Without all the research mentioned above, no realistic confrontation of the pollution problem is possible. Nonetheless, there are certain long-term measures that must also be taken.

— The creation of an underground railway system to ease the traffic burden.

— Electrification of the public transport vehicles, and their sophisticated re-organisation.

— The removal of at least some categories of industries from the Basin of Attica.

— Checking that all vehicles in circulation are in good order, and regulating the emission of exhaust fumes.

— Checking and controlling of the emission of pollutants from industrial installations.

PESTICIDES KILL THOUSANDS OF FISH IN VALENCIA REGION

Madrid EL PAIS in Spanish 2 Jun 81 p 27

[Text] Valencia--Thousands of dead fish have appeared on the beaches of Valencia the past 20 days because of chemical products used as pesticides this time of year for the planting of rice. This has been occurring over the past 7 years or so and coincides with the farmers' massive use of these products, which make planting easier and simpler. Since the quantity of pesticides is greater each year, the problem is getting worse and the quantity of dead fish increasing.

In the opinion of the deputy from this province to the Cortes, Pedro Fos, mayor of Sueca, the Ministry of Agriculture is apparently responsible for this situation for not adequately controlling the use of toxic products. Official sources in the Provincial Agricultural Delegation have told EL PAIS that complete control is practically impossible and that one could only rely on the farmers' sense of responsibility.

The Sueca mayor reported that in his jurisdiction, which has 7 kms of beaches, some 1,500 to 2,000 dead fish have been appearing daily. The other beaches affected by proximity with the Albufera rice region are Gullera, which has some 6 kms of beaches, and Valencia, which has 15.

The death of the fish is caused by toxic products being carried by water from the rice fields to the sea. Albufera itself is the most affected area at this time of year. The problem is aggravated by fish and birds that devour the dead fish, and as a result this peculiar toxic cycle could take on large proportions.

Every day the municipal authorities proceed to clean the beaches of dead fish, which costs them considerable sums in order to avoid the negative consequences this phenomenon could have for the tourist industry, an important source of revenue.

In the opinion of the mayor of Sueca, part of the problem resides in the fact that the labels on the pesticides on the market do not show the real contents, which are more toxic and contaminating than the containers state. The Provincial Agricultural Delegation says it is not aware of this matter and indicates that it employs the controls provided by law for these products.

The problem for the Delegation is that the farmers do not follow the rules issued each year by the Valencia Regional Council on the use of pesticides and points out that it does not have the manpower, through the National Institute for National Conservation of Leon, to watch over the 15,000 hectares of rice fields located in the Province of Valencia.

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